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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,733	02/21/2006	Stefano Barbieri	M0025.0325/P325	2090

24998 7590 02/24/2010  
DICKSTEIN SHAPIRO LLP  
1825 EYE STREET NW  
Washington, DC 20006-5403

EXAMINER
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GOLUB, MARCIA A

ART UNIT	PAPER NUMBER
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2828

MAIL DATE	DELIVERY MODE
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02/24/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/530,733	<b>Applicant(s)</b> BARBIERI ET AL.	
	<b>Examiner</b> MARCIA A. GOLUB	<b>Art Unit</b> 2828	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 December 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 5,6,13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 7-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed on 12/28/09 with respect to claim 1 have been considered but they are moot in view of new grounds of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

**Claims 1-4 and 7-12** are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Barbieri et al. ("Continuous Wave Terahertz Quantum Cascade Laser" found in IDS).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-4 and 7-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohler et al. (Terahertz Quantum Cascade Lasers, found in IDS) hereinafter IDS1 and further in view of Hwang (6,560,259) hereinafter '259.

Fig. 2a of IDS1 discloses a laser comprising:

1. "a substrate comprising a bulk region [Si substrate] and a conducting layer [bottom contact layer];

an active region [active trapezoidal ridge] comprising a quantum cascade structure [Fig 1a] provided on a first surface of the substrate such that said active region is electrically connected to said conducting layer,

the active layer having a thickness selected such that the energy spacing of sub bands formed by the layers causes the active region to lase; (see section B on page 3)

said active region forming a strip on said first surface of the substrate, said strip having cleaved facets at each end; (see 1st paragraph of section IV)

first contact [side contact] provided to said conducting layer such that said first contacts is electrically connected to said active region, and

an active region contact [top contact] provided to said active region such that a potential may be applied between said active region contact and said first contact to cause said active region to lase,

said active region contact being metal contact provided overlying said active region on a surface parallel to said first surface of the substrate and wherein emission from said laser is collected from one of the cleaved facets of said active region.” (see 1st paragraph of section IV)

IDS1 does not disclose:

A second contact, “said first and second contacts being disposed on opposite sides of said active region”

However, making symmetrical contacts on both sides of the active region is well known in the art, as evidenced by Fig 5 of '259. Also, applicant has not disclosed that adding a second contact solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with or without the second contact.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of '259 into the device of 'IDS1 by making a second contact layer on the opposite side of the ridge waveguide for at least the purpose of injecting the current symmetrically into the active layer.

2. “wherein the conducting layer [109] comprises a highly doped semiconductor.”  
( $2 \times 10^{18} \text{ cm}^{-3}$ )

3. “wherein the conducting layer is thin enough [800 nm], such that in operation, the two surface plasmons present at the two interfaces of the conducting layer merge into a single mode.” (see section B on page 3)

4. “ wherein the cascade laser is configured to emit photons having a frequency in the range from 0.02 THz to 100 THz.” 4.4 THz

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9. “wherein said first and second contacts are symmetric about said active region.”

7,8. “wherein the resistance between the first and active region contacts or second and active region contacts is less than twice the resistance of the active region.” No actual structure is recited that would differentiate the invention from the prior art in making the resistance between the contacts less than twice the resistance of the active layer. Also, it is not clear at what operational voltage/current the resistance is measured.

10. “wherein the dielectric constant of the conducting layer is negative relative to the dielectric constant of the surrounding layers.” (see section B on page 3)

11. “wherein the active region comprises a strip waveguide with a trapezoidal cross section.”

12. “wherein the active region comprises a lamination of layers [AlGaAs/GaAs] having at least two different band gaps.”

**Contact Info**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARCIA A. GOLUB-MILLER whose telephone number is (571)272-8602. The examiner can normally be reached on M-Th 9:30-6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marcia A. Golub-Miller/

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828